

Extract from the Register of European Patents**EP1714506**

Date	Document Title	Procedure	No. of Pages
27/09/2006	Notification on forthcoming publication of bibliographic data	Search/Examination	1
13/09/2006	Communication regarding possible amendment of claims/payment of claims fees	Search/Examination	2
28/08/2006	Request for entry into the European phase	Search/Examination	3
28/08/2006	Amended claims filed after receipt of (European) search report	Search/Examination	20
28/08/2006	Acknowledgement of receipt of electronic submission of the request for grant of a European patent	Search/Examination	1
24/08/2006	Notification of the recording of a change	Search/Examination	1
23/08/2006	Copy of the international preliminary examination report	Search/Examination	17
19/06/2006	Information on entry into European phase	Search/Examination	3
11/04/2006	Notification of election of EPO	Search/Examination	1
29/08/2005	Priority document (electronically transmitted)	Search/Examination	45
11/08/2005	International publication of the A1 Pamphlet	Search/Examination	43
11/08/2005	Copy of the international search report	Search/Examination	4

Total Number of Pages: 141



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Generaldirektion 1

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Date

27.09.06

Reference
P19208EP1

Application No./Patent No.
05704774.8 - 2412 PCT/SE2005000108

Applicant/Proprietor
Telefonaktiebolaget L M Ericsson (Publ)

Notification of European publication number and Information on the application of Article 67(3) EPC

The provisional protection under Article 67(1) and (2) EPC in the individual contracting states becomes effective only when the conditions referred to in Article 67(3) EPC have been fulfilled (for further details, see information brochure of the European Patent Office "National Law relating to the EPC" and additional information in the Official Journal of the European Patent Office).

Pursuant to Article 158(1) EPC the publication under Article 21 PCT of an international application for which the European Patent Office is a designated Office takes the place of the publication of a European patent application.

The bibliographic data of the above-mentioned Euro-PCT application will be published on 25.10.06 in Section I.1 of the European Patent Bulletin. The European publication number is 1714506.

In all future communications to the European Patent Office, please quote the application number plus Directorate number.

Receiving Section





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Communication pursuant to Rules 109 and 110 EPC

(1) Amendment of application documents, especially the claims (R. 109 EPC)

The above mentioned international (Euro-PCT) application has entered the European phase, or can do so, once the necessary conditions are fulfilled.

Under Articles 28, 41 PCT, Rules 52, 78 PCT and Rule 86(2) to (4) EPC, the applicant may amend the application documents after receiving the international search report.

Whether or not he has already done so, he now has a further opportunity to file amended claims or other application documents within a non-extendable time limit of one month after notification of the present communication (R. 109 EPC).

The claims applicable on expiry of the above time limit, i.e. those filed on entry into the European phase or in response to the present communication, will form the basis for the calculation of any claims fee to be paid (see page 2) and for any supplementary search to be carried out under Article 157(2) EPC (R. 109 EPC).

--2/

**(2) Claims fees under Rule 110 EPC**

If the application documents on which the European grant procedure is to be based comprise more than ten claims, a claims fee shall be payable for the eleventh and each subsequent claim within the period provided for in Rule 107(1) EPC.

- ☐ Based on the application documents currently on file, all necessary claims fees have already been paid (or the documents do not comprise more than 10 claims).
- ☒ All necessary fees will be/have been debited automatically according to the automatic debit order.
- ☐ The claims fees due for the claims to were not paid within the above-mentioned period.

Any non-paid claims fee, either based on the current set of claims or on any amended claims to be filed pursuant to Rule 109 EPC (see page 1), may still be validly paid within a non-extendable period of grace of **one month** after notification of this communication.

If a payment is made for only some of the claims, it must be indicated for which claims it is intended. If a claims fee is not paid in due time, the claim concerned is deemed to be abandoned (R. 110(4) EPC).

If claims fees have already been paid, but on expiry of the above-mentioned time limit there is a new set of claims containing fewer fee-incurring claims than previously, the claims fees in excess of those due under Rule 110(2), 2nd sentence, EPC will be refunded (R. 110(3) EPC).

You are reminded that any supplementary search under Article 157(2) EPC will relate only to the last set of claims applicable on expiry of the above time limit AND will be confined to those fee-incurring claims for which fees have been paid in due time.

The fee for the eleventh and each subsequent claim is EUR 45,00.

Receiving Section





To the European Patent Office

Entry into the European phase (EPO as designated or elected Office)

European application number	
PCT application number	PCT/SE2005/000108
PCT publication number	WO2005074308
Applicant's or representative's reference	P19208EP1
1. Applicant Particulars of the applicant(s) are contained in the international publication or were recorded by the International Bureau subsequent to the international publication. Changes which have not yet been recorded by the International Bureau are set out here: Address for correspondence	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. Representative 1 This is the representative who will be listed in the Register of European Patents and to whom notifications will be made Name Registration No Address of place of business Telephone Fax e-mail Any additional representative(s) is/are listed here:	Kühn, Mr Friedrich 100058148 Ericsson AB Patent Unit Radio Networks Torshamnsgatan 23 Stockholm, 164 80 Sweden +46 8 4042725 +46 8 7641514 friedrich.kuhn@ericsson.com <input type="checkbox"/>
3. General Authorisation: An individual authorisation is attached. A general authorisation has been registered under No: A general authorisation has been filed, but not yet registered. The authorisation filed with the EPO as PCT receiving Office expressly includes the European phase.	<input type="checkbox"/> <input checked="" type="checkbox"/> 48902 <input type="checkbox"/> <input type="checkbox"/>
4. Request for examination Examination of the application under Art. 94 EPC is hereby requested. The examination fee is being (has been, will be) paid. Request for examination in an admissible non-EPO language:	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Härmed begärs prövning av patentansökan enligt art. 94.
5. Copies One or more additional sets of copies of the documents cited in the supplementary European search report are hereby requested. Number of additional sets of copies	<input type="checkbox"/>
6. Documents intended for proceedings before the EPO 6.1 Proceedings before the EPO as designated Office (PCT I) are to be based on the following documents:	

<p>the application documents published by the International Bureau (with all claims, description and drawings), where applicable with amended claims under Art. 19 PCT unless replaced by the amendments attached.</p>	<input type="checkbox"/> <input type="checkbox"/>
<p><i>Where necessary, clarifications should be attached as 'Other Documents'</i></p> <p>6.2 Proceedings before the EPO as elected Office (PCT II) are to be based on the following documents:</p> <p>the documents on which the international preliminary examination report is based, including any annexes unless replaced by the amendments attached.</p> <p><i>Where necessary, clarifications should be attached as 'Other Documents'</i></p> <p>If the EPO as International Preliminary Examining Authority has been supplied with test reports, these may be used as the basis of proceedings before the EPO.</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
<p>7. Translations</p> <p>Translations in one of the official languages of the EPO (English, French, German) are attached as crossed below:</p> <p><i>* In proceedings before the EPO as designated or elected Office (PCT I + II):</i></p> <p>Translation of the international application (description, claims, any text in the drawings) as originally filed, of the abstract as published and of any indication under Rule 13bis.3 and 13bis.4 PCT regarding biological material</p> <p>Translation of the priority application(s)</p> <p>It is hereby declared that the international application as originally filed is a complete translation of the previous application (Rule 38(5) EPC)</p> <p><i>* In addition, in proceedings before the EPO as designated Office (PCT I):</i></p> <p>Translation of amended claims and any statement under Art. 19 PCT, if the claims as amended are to form the basis for the proceedings before the EPO (see Section 6).</p> <p><i>* In addition, in proceedings before the EPO as elected office (PCT II):</i></p> <p>Translation of annexes to the international preliminary examination report</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<p>8. Biological material</p> <p>The invention relates to and/or uses biological material deposited under Rule 28 EPC.</p> <p>The particulars referred to in Rule 28(1)(c) EPC (if not yet known, the depository institution and the identification reference(s)) [number, symbols, etc.] of the depositor are given in the international publication or in the translation submitted under Section 7 on:</p> <p>page(s) / line(s)</p> <p>A copy of the receipt(s) of deposit issued by the depository institution is attached</p> <p>will be filed at a later date</p> <p>A waiver of the right to an undertaking from the requester pursuant to Rule 28(3) EPC is attached.</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<p>9. Nucleotide and amino acid sequences</p> <p>The items required under Rules 5.2 and 13ter PCT and Rule 111(3) EPC have already been furnished to the EPO.</p> <p>The sequence listing as part of the description is attached in PDF format.</p> <p>The sequence listing does not include matter that goes beyond the content of the application as filed.</p> <p>In addition, the sequence listing data is attached in computer-readable form in accordance with WIPO Standard 25.</p> <p>The sequence listing data in computer-readable form in accordance with WIPO Standard 25 is identical to the sequence listing in PDF format.</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<p>10. Designation fees</p> <p>10.1 It is currently intended to pay seven times the amount of the designation fee. The designation fees for all the EPC contracting states designated in the international application are thereby deemed to have been paid (Art. 2 No. 3 RFees).</p> <p>AT BE BG CH&LI CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LT LU MC NL PL PT RO SE SI SK TR</p>	<input checked="" type="checkbox"/>

10.2 It is currently intended to pay fewer than seven designation fees for the following EPC contracting states designated in the international application:



10.3 It is requested that no communication under Rules 85a(1) or 69(1) need be notified in respect of the contracting states not indicated. If an automatic debit order has been issued, the EPO is authorised, on expiry of the basic period under Article 79(2), to debit seven times the amount of the designation fee. If less than seven states are indicated, the EPO shall debit designation fees only for those states, unless it is instructed to do otherwise before expiry of the basic period.



11. Extension of the European patent

This application is also considered as being a request for extension to all the non-contracting states to the EPC designated in the international application with which "extension agreements" were in force on the date of filing the international application. However, the extension only takes effect if the prescribed extension fee is paid.



It is currently intended to pay the extension fee for the following states:

12. List of enclosed documents

	Description of document	Original file name	Assigned file name
1	Amendments	P19208EP1 2006-08-28 Amendments.pdf	OTHER-1.pdf

13. Automatic debit order

Currency



EUR

The European Patent Office is hereby authorised, under the Arrangements for the automatic debiting procedure, to debit from the deposit account any fees and costs falling due.

Deposit account number

28100092

Account holder

Ericsson AB

14. Reimbursements (if any) should be made to the following EPO deposit account:



Number and account holder

Ericsson AB, 28100092

15. Fees

		Factor/Reduction applied	Fee schedule	Amount to be paid
15-1	002 Search fee	0	720.00	0.00
15-2	005 Designation fee	7	80.00	560.00
15-3	006 Examination fee	0.8	1 490.00	1 192.00
15-4	015 Claims fee	20	45.00	900.00
15-5	020 Basic national fee for an international application	1	95.00	95.00
Total:			EUR	2 747.00

16. Annotations

17. Signature(s) of applicant(s) or representative

Place: Stockholm Sweden
 Date: 28.August 2006
 Signed by: /Friedrich Kühn/
 Capacity: (Representative)

Some exemplary features and characteristics of the invention are listed below.

1. A method of base station change, the base station transferring packet switched communications between a mobile station and a support node, the method characterized in that the base station change is of lossless type allowing lossless base station change of packet switched communications in unacknowledged mode between the mobile station and the support node, the support node acting as source support node during the base station change forwarding maintained sequence number information to a target support node of the base station change when the source and target support nodes are different.

2. The method according to characteristic 1 characterized in that a protocol entity maintains N-PDU send and receive sequence numbers, and GTP T-PDU uplink and downlink sequence numbers for each packet flow subject to base station change of lossless type, the support node acting as source support node during the base station change, forwarding maintained sequence number information to a target support node of the base station change.

3. The method according to characteristic 2 characterized in that downlink N-PDU and downlink GTP T-PDU sequence numbers are provided along with each N-PDU forwarded from the source support node to the target support node.

4. The method according to characteristic 2 characterized in that LLC data buffered in source BSS that has not been sent to, or acknowledged by, the mobile station at the point in time when the source BSS sends the PS handover command message to the mobile station is deleted.

5. The method according to characteristic 4 characterized in that a status message is sent back to the source support node telling it how many LLC PDUs have been deleted.

6. The method according to characteristic 5 characterized in that the status message provides part of the one or more deleted LLC PDUs.

7. The method according to characteristic 6 characterized in that the status message provides the header of the one or more deleted LLC PDUs.

8. The method according to characteristic 2 characterized in that a set of N-PDUs sent down to the source BSS are buffered in the support node for each packet flow subject to lossless PS handover.

9. The method according to characteristic 2 characterized in that a PS handover command message contains an RLC ACK/NACK report allowing a mobile station to determine which one or more N-PDUs have been completely received by the network.

10. The method according to characteristic 2 characterized in that a mobile station starts uplink transmission upon handover to a target cell, by an estimated next uplink N-PDU that was not acknowledged by lower layers in a source cell from which the mobile station was handed over to the target cell.

11. The method according to characteristic 2 characterized in that a PS handover command sent from the support node to a source BSS includes expected Receive N-PDU

sequence number, at which a mobile station should start transmission in a target cell for each uplink packet flow subject to lossless handover.

12. The method according to characteristic 2 characterized in that a mobile station buffers one or more uplink N-PDUs which have been confirmed according to RLC.

13. The method according to characteristic 2 characterized in that uplink and downlink G-PDU sequence numbers associated with uplink and downlink N-PDUs are recorded while in unacknowledged mode between the mobile station and the support node.

14. The method according to characteristic 1 characterized in that the base station change allows an entire data transfer session in unacknowledged mode.

15. The method according to characteristic 14 characterized in that the data transfer session is a session of data file transfer.

16. The method according to characteristic 1 characterized in that the packet switched communications in unacknowledged mode between the mobile station and the support node concerns unacknowledged mode of LLC protocol.

17. The method according to characteristic 1 comprising a mode of operation characterized by recording one or more sequence numbers of one or more protocol data units in both uplink and downlink.

18. The method according to characteristic 17 characterized in that the protocol data units are N-PDUs.

19. The method according to characteristic 17 c h a r a c -
t e r i z e d i n that the protocol data units are G-PDUs.

20. The method according to characteristic 1 c h a r a c -
t e r i z e d i n that SNDCP sequence continuity is maintained
across a support node involved in packet switched base station
change.

21. The method according to characteristic 1 c h a r a c -
t e r i z e d i n that one or more SN-UNITDATA protocol data
unit includes one or more N-PDU.

22. The method according to characteristic 21 c h a r a c -
t e r i z e d i n that N-PDU number is included in a header of
SN-UNITDATA protocol data unit.

23. The method according to characteristic 1 c h a r a c -
t e r i z e d i n that a support node connected to a source
base station or base station subsystem to be changed informs a
mobile station, also connected to the base station or base
station subsystem, on a next expected uplink protocol data unit
to be received.

24. The method according to characteristic 1 c h a r a c -
t e r i z e d i n that a mobile station connected to a source
base station or base station subsystem to be changed informs a
source support node, also connected to the base station or base
station subsystem, on a next expected downlink protocol data unit
to be received.

25. The method according to characteristic 23 or 24 c h a r -
a c t e r i z e d i n that the base station or base station
subsystem relays the information between mobile station and
support node with no required processing of the information.

26. The method according to any of characteristics 23-25 characterized in that the source base station or base station subsystem is allowed to continue receiving uplink data while emptying downlink buffers as a response to a PS Handover Command.

27. The method according to any of characteristics 1-26 characterized in that the protocol data units are compliant with Sub-Network Dependent Convergence Protocol.

28. The method according to characteristic 27 characterized in that SNDCP entities in a source support node buffers one or more downlink N-PDUs.

29. The method according to characteristic 28 characterized in that the source support node buffers a number of N-PDUs corresponding to the delay attribute of the associated packet flow.

30. The method according to characteristic 29 characterized in that the buffered N-PDUs are forwarded to a target support node during the base station change.

31. The method according to characteristic 30 characterized in that the received forwarded N-PDUs in target support node are forwarded to the mobile station.

32. The method according to characteristic 31 characterized in that the one or more N-PDUs are forwarded to the mobile station when the support node has received a PS Handover Complete message.

33. The method according to characteristic 27 characterized in that one or more downlink N-PDUs are buffered in SNDCP entities in a target support node.

34. The method according to characteristic 33 characterized in that the target support node buffers a number of uplink N-PDUs corresponding to the number of N-PDUs received from the source support node.

35. The method according to characteristic 27 characterized in that one or more uplink N-PDUs are buffered in SNDCP entities in a mobile station.

36. The method according to characteristic 35 characterized in that the mobile station buffers a number of N-PDUs corresponding to the maximum delay of RLC/MAC acknowledgement of transmission of LLC PDU.

37. A mobile station for packet switched communications communicating over a communications network including base stations and one or more support nodes, the mobile station characterized by processing means operating according to one or more protocols receiving protocol data units, the processing means extracting information for the mobile station to inform the network of next expected downlink protocol data unit in association with packet switched base station change allowing lossless base station change of packet switched communications in unacknowledged mode.

38. A mobile station for packet switched communications communicating over a communications network including base stations and one or more support nodes, the mobile station characterized by processing means operating according to one or more protocols transferring protocol data units and receiver receiving informing from the network on next expected uplink protocol data unit in association with packet

switched base station change allowing lossless base station change of packet switched communications in unacknowledged mode.

39. The mobile station according to characteristic 37 or 38 characterized in that the protocol data units are compliant with Sub-Network Dependent Convergence Protocol.

40. The mobile station according to characteristic 39 characterized by a buffer for buffering one or more uplink N-PDUs which have been confirmed according to RLC.

41. The mobile station according to characteristic 40 characterized in that the mobile station starts uplink transmission upon handover to a target cell, by transmitting an estimated next uplink N-PDU that was not acknowledged by lower layers in a source cell from which the mobile station was handed over to the target cell.

42. The mobile station according to characteristic 41 characterized by the processing means recording according to the Sub-Network Dependent Convergence Protocol N-PDU sequence numbers of N-PDUs received or transferred.

43. The mobile station according to characteristic 39 or 40 characterized by protocol data units including N-PDUs.

44. The mobile station according to any of characteristics 41-43 characterized by buffer means, buffering uplink N-PDUs

45. The mobile station according to characteristic 44 characterized in that the buffer size is sufficiently large for a number of N-PDUs corresponding to the maximum delay

of RLC/MAC acknowledgement of transmission of LLC PDU to be buffered.

46. The mobile station according to any of characteristics 39-43 characterized in that the information on next expected protocol data unit is transferred in a message initiating or completing a change of base station or handover as regards the mobile station.

47. The mobile station according to characteristic 46 characterized in that the message initiating or completing a change of base station or handover is a PS Handover Command or PS Handover Complete message.

48. A support node in a packet switched communications network comprising base stations for communications involving at least one mobile station, the support node characterized by processing means operating according to one or more protocols receiving protocol data units, the processing means extracting information for the support node to inform a mobile station of next expected uplink protocol data unit in association with packet switched base station change in unacknowledged mode of the at least one mobile station.

49. A support node in a packet switched communications network comprising base stations for communications involving at least one mobile station, the support node characterized by processing means operating according to one or more protocols transferring protocol data units and receiver receiving informing from the at least one mobile station on next expected downlink protocol data unit in association with packet switched handover allowing lossless base station change in unacknowledged mode of packet switched communications.

50. The support node according to characteristic 49 characterized by a protocol entity for maintaining N-PDU send and receive sequence numbers, and GTP T-PDU uplink and downlink sequence numbers for each packet flow subject to base station change of lossless type, the support node acting as source support node during the base station change, forwarding maintained sequence number information to a target support node of the base station change.

51. The support node according to characteristic 50 characterized by processing means for providing downlink N-PDU and downlink GTP T-PDU sequence numbers along with each N-PDU forwarded to the target support node.

52. The support node according to characteristic 50 characterized by a buffer for buffering a set of N-PDUs sent down to the source BSS for each packet flow subject to lossless PS handover.

53. The support node according to characteristic 50 characterized by processing means for including an RLC ACK/NACK report in a PS handover command message, allowing a mobile station to determine which one or more N-PDUs have been completely received by the network.

54. The support node according to characteristic 50 characterized in that a PS handover command sent from the support node to a source BSS includes expected Receive N-PDU sequence number, at which a mobile station should start transmission in a target cell for each uplink packet flow subject to lossless handover.

55. The support node according to characteristic 50 characterized by recording means for recording uplink and

downlink G-PDU sequence numbers associated with uplink and downlink N-PDUs while in unacknowledged mode between the mobile station and the support node.

56. The support node according to characteristic 49 characterized in that the base station change is within GERAN or between GERAN and UTRAN.

57. The support node according to characteristic 49 characterized in that a protocol entity of the support node maintains sequence continuity over the support node.

58. The support node according to characteristic 57 characterized in that the protocol entity operates according to SNDCP.

59. The support node according to characteristic 49 characterized in that upon completion of a packet switched base station change, the support node sustaining the base station changed to starts transmissions of protocol data units to the at least one mobile station at the next protocol data unit expected by the at least one mobile station.

60. The support node according to characteristic 59 characterized by receive means, the transmissions being started upon the receive means receiving a PS Handover Complete message.

61. The support node according to any of characteristics 48-60 characterized in that the protocol data units are compliant with Sub-Network Dependent Convergence Protocol.

62. The support node according to characteristic 61 characterized by the processing means recording according

to the Sub-Network Dependent Convergence Protocol N-PDU sequence numbers of N-PDUs received or transferred.

63. The support node according to characteristic 61 characterized by the processing means recording according to the Sub-Network Dependent Convergence Protocol G-PDU sequence numbers of G-PDUs received or transferred.

64. The support node according to any of characteristics 61-63 characterized by buffer means, buffering downlink N-PDUs

65. The support node according to characteristic 64 characterized in that the buffer size is sufficiently large for a number of N-PDUs corresponding to a delay attribute of the associated packet flow.

66. The support node according to any of characteristics 48-65 characterized in that the information on next expected protocol data unit is transferred in a message initiating or completing a change of base station or handover as regards the at least one mobile station.

67. The support node according to characteristic 66 characterized in that the message initiating or completing a change of base station or handover is a PS Handover Command or PS Handover Complete message.

68. The support node according to characteristic 64 or 65 characterized in that the buffered protocol data units are transferred upon packet switched base station change to a support node sustaining packet switched communications over the base station to which the at least one mobile station changed.

69. The support node according to characteristic 68 characterized in that the buffered protocol data units are transferred upon completion of a preparation phase of the packet switched base station change.

70. The support node according to any of characteristics 48-69 characterized in that the support node is a Serving GPRS Support Node.

71. A base station entity in a packet switched communications network comprising at least one support node for communications involving at least one mobile station, the base station entity characterized by receive means, transmit means and buffer means, the buffer means buffering downlink protocol data units, the buffer means being emptied of protocol data units destined for the at least one mobile station, the protocol data units being transmitted by the transmit means upon the receive means receiving a command of packet switched base station change in unacknowledged mode, as regards the one mobile station, from the at least one support node.

72. The base station entity according to characteristic 71 characterized by processing means for deleting buffered LLC data that has not been sent to, or acknowledged by, the mobile station at the point in time when the source BSS sends the PS handover command message to the mobile station.

73. The base station entity according to characteristic 72 characterized by sending means for sending a status message back to the source support node telling it how many LLC PDUs have been deleted.

74. The base station entity according to characteristic 73 characterized in that the status message provides part of the one or more deleted LLC PDUs.

75. The base station entity according to characteristic 74 characterized in that the status message provides the header of the one or more deleted LLC PDUs.

76. The base station entity according to characteristic 71 characterized by receive means and transmit means, the receive means receiving uplink packet data from the at least one mobile station while the buffer means being emptied of protocol data units destined for the at least one mobile station.

77. A communications system characterized by means for carrying out the method in any of characteristics 1-36.

78. A communications system characterized by a plurality of mobile stations in any of characteristics 37-47, the mobile stations being capable of reciprocal packet switched communications.

79. A communications system characterized by a plurality of support nodes in any of characteristics 48-70.

80. A communications system characterized by a plurality of base station entities in any of characteristics 71-76.

A person skilled in the art readily understands that the properties of an SGSN, a GGSN, a BSS, a base station or an MS are general in nature. The use of concepts such as SGSN or MS within this patent application is not intended to limit the invention only to devices associated with these acronyms. It concerns all

devices operating correspondingly, or being obvious to adapt thereto by a person skilled in the art, in relation to the invention. As an explicit non-exclusive example the invention relates to mobile equipment without a subscriber identity module, SIM, as well as mobile stations including one or more SIMs. Further, protocols and layers are referred to in close relation with GPRS, UMTS and Internet terminology. However, this does not exclude applicability of the invention in other systems with other protocols and layers of similar functionality.

The invention is not intended to be limited only to the embodiments described in detail above. Changes and modifications may be made without departing from the invention. It covers all modifications within the scope of the following claims.

CLAIMS

1. A method of base station change, the base station transferring packet switched communications between a mobile station and a support node, the method characterized in that the base station change is of lossless type allowing lossless base station change of packet switched communications in unacknowledged mode between the mobile station and the support node, the support node acting as source support node during the base station change forwarding maintained sequence number information to a target support node of the base station change when the source and target support nodes are different.
2. The method according to claim 1 characterized in that a protocol entity maintains N-PDU send and receive sequence numbers, and GTP T-PDU uplink and downlink sequence numbers for each packet flow subject to base station change of lossless type, the support node acting as source support node during the base station change, forwarding maintained sequence number information to a target support node of the base station change.
3. The method according to claim 2 characterized in that downlink N-PDU and downlink GTP T-PDU sequence numbers are provided along with each N-PDU forwarded from the source support node to the target support node.
4. The method according to claim 2 characterized in that LLC data buffered in source BSS that has not been sent to, or acknowledged by, the mobile station at the point in time when the source BSS sends the PS handover command message to the mobile station is deleted.

5. The method according to claim 2 characterized in that a set of N-PDUs sent down to the source BSS are buffered in the support node for each packet flow subject to lossless PS handover.

6. The method according to claim 2 characterized in that a PS handover command message contains an RLC ACK/NACK report allowing a mobile station to determine which one or more N-PDUs have been completely received by the network.

7. The method according to claim 2 characterized in that a mobile station starts uplink transmission upon handover to a target cell, by an estimated next uplink N-PDU that was not acknowledged by lower layers in a source cell from which the mobile station was handed over to the target cell.

8. The method according to claim 1 characterized in that the base station change allows an entire data transfer session in unacknowledged mode.

9. The method according to claim 8 characterized in that the data transfer session is a session of data file transfer.

10. The method according to claim 1 characterized in that SNDCP sequence continuity is maintained across a support node involved in packet switched base station change.

11. The method according to claim 1 characterized in that one or more SN-UNITDATA protocol data unit includes one or more N-PDU.

12. The method according to claim 11 characterized in that N-PDU number is included in a header of SN-UNITDATA protocol data unit.

13. The method according to claim 1 characterized in that a mobile station connected to a source base station or base station subsystem to be changed informs a source support node, also connected to the base station or base station subsystem, on a next expected downlink protocol data unit to be received.

14. A mobile station for packet switched communications communicating over a communications network including base stations and one or more support nodes, the mobile station characterized by processing means operating according to one or more protocols receiving protocol data units, the processing means extracting information for the mobile station to inform the network of next expected downlink protocol data unit in association with packet switched base station change allowing lossless base station change of packet switched communications in unacknowledged mode.

15. A mobile station for packet switched communications communicating over a communications network including base stations and one or more support nodes, the mobile station characterized by processing means operating according to one or more protocols transferring protocol data units and receiver receiving informing from the network on next expected uplink protocol data unit in association with packet switched base station change allowing lossless base station change of packet switched communications in unacknowledged mode.

16. The mobile station according to claim 14 or 15 characterized in that the protocol data units are compliant with Sub-Network Dependent Convergence Protocol.

17. The mobile station according to claim 16 characterized in that the mobile station starts uplink transmission upon handover to a target cell, by transmitting an estimated next uplink N-PDU that was not acknowledged by lower layers in a source cell from which the mobile station was handed over to the target cell.

18. The mobile station according to claim 17 characterized by the processing means recording according to the Sub-Network Dependent Convergence Protocol N-PDU sequence numbers of N-PDUs received or transferred.

19. A support node in a packet switched communications network comprising base stations for communications involving at least one mobile station, the support node characterized by processing means operating according to one or more protocols receiving protocol data units, the processing means extracting information for the support node to inform a mobile station of next expected uplink protocol data unit in association with packet switched base station change in unacknowledged mode of the at least one mobile station.

20. A support node in a packet switched communications network comprising base stations for communications involving at least one mobile station, the support node characterized by processing means operating according to one or more protocols transferring protocol data units and receiver receiving informing from the at least one mobile station on next expected downlink protocol data unit in association with packet switched handover allowing lossless base station change in unacknowledged mode of packet switched communications.

21. The support node according to claim 20 characterized by a protocol entity for maintaining N-PDU send and receive sequence numbers, and GTP T-PDU uplink and downlink sequence numbers for each packet flow subject to base station change of lossless type, the support node acting as source support node during the base station change, forwarding maintained sequence number information to a target support node of the base station change.

22. The support node according to claim 20 characterized in that a protocol entity of the support node maintains sequence continuity over the support node.

23. The support node according to claim 22 characterized in that the protocol entity operates according to SNDCP.

24. A base station entity in a packet switched communications network comprising at least one support node for communications involving at least one mobile station, the base station entity characterized by receive means, transmit means and buffer means, the buffer means buffering downlink protocol data units, the buffer means being emptied of protocol data units destined for the at least one mobile station, the protocol data units being transmitted by the transmit means upon the receive means receiving a command of packet switched base station change in unacknowledged mode, as regards the one mobile station, from the at least one support node.

25. The base station entity according to claim 24 characterized by processing means for deleting buffered LLC data that has not been sent to, or acknowledged by, the mobile

station at the point in time when the source BSS sends the PS handover command message to the mobile station.

26. The base station entity according to claim 24 characterized by receive means and transmit means, the receive means receiving uplink packet data from the at least one mobile station while the buffer means being emptied of protocol data units destined for the at least one mobile station.

27. A communications system characterized by means for carrying out the method in any of claims 1-13.

28. A communications system characterized by a plurality of mobile stations in any of claims 14-18, the mobile stations being capable of reciprocal packet switched communications.

29. A communications system characterized by a plurality of support nodes in any of claims 19-23.

30. A communications system characterized by a plurality of base station entities in any of claims 24-26.



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